

# PATENT SPECIFICATION

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## (54) ROTATABLE RADIATOR ASSEMBLY FOR A VEHICLE

(71) We, CATERPILLAR TRACTOR CO., a corporation organized and existing under the laws of the State of California, United States of America, of 100 N.E. Adams Street, Peoria, Illinois, 61629, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to radiator assemblies for vehicles.

During operation, air flow generally passes in a single direction through the radiator of a vehicle engine. Eddy currents within the radiator generally permit airborne foreign materials such as greases, dust, and dirt to be deposited on heat exchanger surfaces of the radiator. As these deposited materials increase, the cooling efficiency of the radiator decreases. As is known in the art, the radiators are generally of a construction which causes cleaning of the radiator to be difficult and undesirably time consuming. These undesirable events are particularly pronounced where the vehicle operates in extremely dusty conditions.

According to the present invention a vehicle engine radiator assembly comprises a radiator having first and second opposed surfaces; an inlet conduit; an outlet conduit; and means enabling the passage of engine coolant from the inlet to the outlet while cooling air is passed from one of the surfaces, through the radiator, to the other surface; a first fluid coupling pivotally connected to the inlet and being arranged to allow fluid to pass into the inlet in both a first position of the radiator in which the first surface is directed outwardly from the vehicle and a second position of the radiator in which the second surface is directed outwardly from the vehicle; a second fluid coupling pivotally connected to the outlet and being arranged to allow fluid to pass

from the outlet in the first and second radiator positions; and first means associated with at least one of the fluid couplings for maintaining said coupling or couplings fixed to the vehicle whilst permitting movement of the fluid couplings toward and from the first and second positions.

Thus there is provided an assembly which has a rotatable radiator which permits the direction of the passage of air therethrough to be reversed relative to the radiator, and which functions to remove accumulated foreign material from the radiator.

One example of a radiator assembly according to the invention will now be described with reference to the accompanying drawings in which:—

FIG. 1 is a diagrammatic side view of a vehicle;

FIG. 2 is a diagrammatic sectional view taken along line II—II of FIG. 1; and

FIG. 3 is a diagrammatic sectional view of a fluid coupling of the radiator of the invention.

As can be seen in Fig. 1, a vehicle 10 has an engine 11, and a radiator assembly 12 having a radiator 13 for cooling fluids from the engine 11 by moving air through the radiator 13 by a fan 14. As is known in the art, the radiator 13 has first and second opposed surfaces 15, 16, an inlet conduit 17 for passing fluid from the engine 11 into the radiator 13, an outlet conduit 18 for returning fluid from the radiator 13 to the engine, and a tortuous fluid pathway (not shown) for passing fluid from the inlet 17 to the outlet 18 while passing air by the fan 14 from one surface 15, through the radiator 13 and to the other surface 16. It should be understood that by use of the word "radiator" herein, it is intended to cover any type of heat exchanger.

A first fluid coupling 20 is pivotally connected to the inlet conduit 17 and is of a construction sufficient for passing fluid into the inlet 17, as herein-

after more fully described, at a first position at which the first surface 15 of the radiator 13 is directed outwardly from the vehicle 10 and at a second position, as shown in FIG. 2, at which the second surface 16 is directed outwardly from the vehicle 10. A second fluid coupling 21 is pivotally connected to the outlet 18 of the radiator 13 and is of a construction sufficient for passing fluid from the outlet 18 at said first and second positions.

Referring to FIG. 2, first means 22 is provided for maintaining at least one of the fluid couplings 20 fixed to the vehicle 10 whilst permitting movement of both of the fluid couplings 20, 21 toward and from the vehicle 10 for movement of the surfaces between the first and second positions. in the preferred embodiment of FIG. 1, a first means 22, 22' is associated with each fluid coupling 20, 21.

Means 22 can be of like or different structure than means 22'. Preferably, each are of common construction and only the construction of means 22 will be described, for purposes of brevity.

The first means 22 comprises an elongate bar element 23 having an longitudinal axis "A", a first end portion 24 connected to the vehicle 10, and a second end portion 25 having an opening extending therethrough for receiving the associated fluid coupling 20. The first means 22 and associated fluid coupling 20 can as shown be a unitary element. The elongate element 23 can be of other construction and fixed to the vehicle by other means without departing from the scope of this invention.

The first end portion 24 of the elongated element 23 has a slot 29 preferably extending along the axis "A". Second means 30, such as bolts, extend through the slot 29 and are connectable to the vehicle 10 for movably connecting the first means 22 to the vehicle. The first means 22 is movable from a first position, shown by solid lines, at which the radiator 13 can be rotated and a second position, shown by broken lines "B", at which the radiator 13 is closer to the vehicle and at a normal operation position.

The couplings 20 and 21 are of similar construction and, referring to Fig. 3, the coupling 20 has an internal chamber 31, a fluid passageway 32 communicating with the chamber 31, and adjacent bores 33, 34 respectively located on opposed sides of the chamber 31. The bores 33, 34 are of a size suitable for receiving a respective one of the inlet or outlet conduits 17, 18.

Each inlet and outlet conduit 17, 18 has at least one opening 35 in the wall thereof, that is positioned at a location to place the interior of the conduit 17, 18 in communication with the chamber 31. Means 36, such as O-ring seals 37, 38 are provided for

maintaining a fluid seal between the fluid coupling 20 and the associated respective conduit 17. Here O-rings 37, 38 are positioned in the annulus between the conduit 17 and the fluid coupling 20 each on an opposed side of the chamber 31.

In the operation of the apparatus, after sufficient dirt has accumulated on the radiator 13 to begin to affect detrimentally the efficiency of the radiator, the bolts 30 are loosened, element 23 is moved outwardly from the vehicle 10, the radiator 13 is rotated 180° about the couplings 20, 21, and the element 23 and associated radiator is moved back to the original position "B". At this changed orientation of the radiator 13 relative to the engine 11 and fan 14, air flow through the radiator is reversed relative to the original. The forces from the air passing through the radiator in a reverse direction function to displace dirt and other foreign material which have accumulated on radiator 13.

#### WHAT WE CLAIM IS:—

1. A vehicle engine radiator assembly comprising a radiator having first and second opposed surfaces; an inlet conduit; an outlet conduit; and means enabling the passage of engine coolant from the inlet to the outlet while cooling air is passed from one of the surfaces, through the radiator, to the other surface; a first fluid coupling pivotally connected to the inlet and being arranged to allow fluid to pass into the inlet in both a first position of the radiator in which the first surface is directed outwardly from the vehicle and a second position of the radiator in which the second surface is directed outwardly from the vehicle; a second fluid coupling pivotally connected to the outlet and being arranged to allow fluid to pass from the outlet in the first and second radiator positions; and first means associated with at least one of the fluid couplings for maintaining said coupling or couplings fixed to the vehicle whilst permitting movement of both fluid couplings toward and from the vehicle for allowing movement of the radiator between the first and second positions.

2. An assembly according to claim 1, wherein first means are associated with both the first and second fluid couplings.

3. An assembly according to claim 1 or claim 2, wherein the first means comprises an elongate bar element having a first end portion connected to the vehicle, and a second end portion connected to one of the fluid couplings.

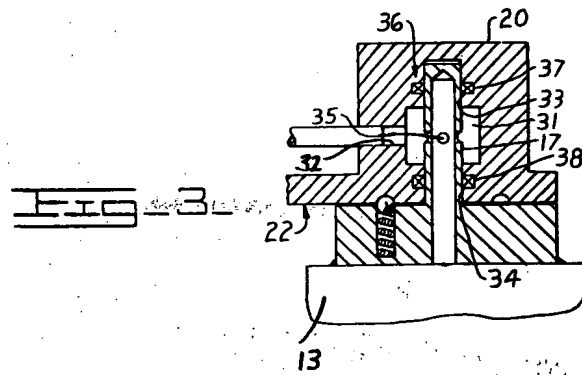
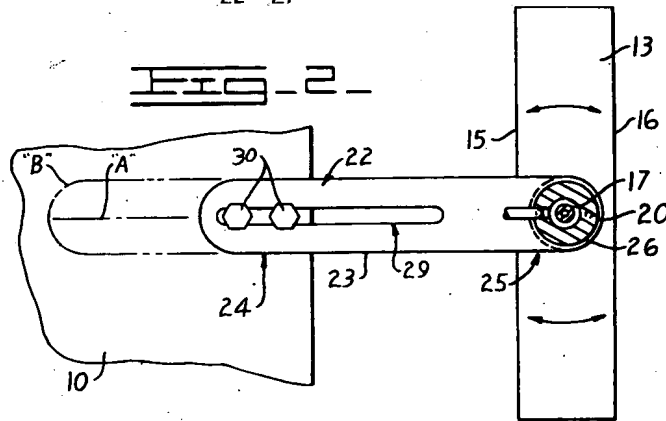
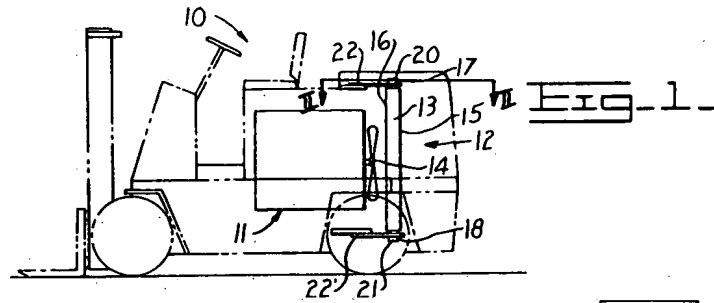
4. An assembly according to claim 3, wherein the first end portion of the elongate bar element has a slot extending along the longitudinal axis of the element; and including second means comprising releasable

- fixing means, extending through the slot and being connectable to the vehicle for adjustably connecting the first means to the vehicle.
- 5 5. An assembly according to any one of claims 1 to 4, wherein each fluid coupling has a chamber therein; a fluid passageway communicating with the chamber; and bores on opposite sides of the chamber for receiving a respective one of the inlet and outlet conduits, each inlet and outlet conduit having at least one opening in the wall thereof communicating with the chamber of the respective fluid coupling; and means for maintaining a fluid seal between each fluid coupling and the associated respective conduit.
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6. An assembly according to claim 5, wherein each sealing means comprises a pair of O-rings positioned on opposite sides of the chamber in annular grooves found in the walls of the bores in the coupling. 20
7. An assembly according to claim 1, substantially as described with reference to the accompanying drawings. 25
8. A vehicle having a radiator assembly according to any one of claims 1 to 7.

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